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EXAMINER

SWERDLOW, DANIEL

ART UNIT PAPER NUMBER

2646

DATE MAILED: 07/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/644,141

Applicant(s)

THIRUMOORTHY, HARI

Examiner

Daniel Swerdlow

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the receiving an input signal, storing a value, modifying the input signal, analog input signal, outputting the modified signal, plurality of bits, determining a range of values, measuring echo amplitude, scaling element, and computer readable medium must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: The specification is ambiguous as to the meaning of the term “tap”. On lines 4 and 5 of page 6, the specification states “A FIR tap is typically a pair of values representing a coefficient and a delayed input signal sample”. On lines 3 through 5 of page 7, the specification states “[t]he taps of the filter should then be similar to the actual impulse response samples of the hybrid causing the echo”, indicating that the taps are the filter coefficients. On lines 1 through 6 of page 8, the specification states “for a given voice channel the highest normal, or maximum amplitude of any tap may be plus or minus 0.25 volts. Then the maximum possible range of numbers that may be represented by a tap, assuming 16-bits of precision, is -32768 to 32767. The value 32767 may then be set to represent 0.25 volts and the value -32767 may be set to represent -0.25 volts. That provides a resolution of $0.25/32767$, or 7.62 microvolts”, indicating that the taps are the delayed input samples. Spanning pages 8 and 9, the specification states “when an analog signal is sampled and that analog signal includes an echo represented by an amplitude and the echo amplitude is to be identified by a FIR filter and held in a 16-bit word, then highest resolution may be achieved for the echo by scaling the actual echo canceller taps to the value that may be held in the 16-bit word”, indicating that the tap is the product of a delayed input sample and a coefficient. As such, the specification presents at least four different meanings for the term tap.
3. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1 through 16, 21 and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "tap" in the claims is indefinite because the specification provides at least four distinct meanings for the term, as shown above.
6. In addition, Claim 30 recites the limitation "the tap". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1 through 13, 26 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Sih (US Patent 5,559,881).
9. Regarding Claim 1, Sih discloses a method for canceling echo (i.e., signal modification) comprising: receiving a far-end speech (i.e., input) signal (Fig. 5, reference x(n); column 9, lines 14-16) at the input of an echo canceller filter (Fig. 5, reference 156, 158, 160); attenuating input samples (i.e., scaling a binary range associated with filter taps) (column 17, lines 21-32) relative to a preset value near the top of the range (i.e., to a value of a high amplitude portion of the input signal); storing the scaled input values in the filter taps (Fig. 4, reference 120; column 7, lines 3-10) and multiplying (i.e., modifying) the input signal sample values (i.e., input signal) by

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coefficients (i.e., amounts) associated with the input signal sample values (i.e., stored portion of the input signal) (Fig. 4, reference 120, 122, h; column 7, lines 3-10).

10. Regarding Claim 2, Sih further discloses the received signal is a voice (i.e., analog) signal (column 4, lines 48-49).

11. Regarding Claim 3, Sih further discloses a finite impulse response filter (Fig. 4).

12. Regarding Claim 4, Sih further discloses a tapped delay line (Fig. 4, reference 120) that stores amplitudes of all portions of the input signal.

13. Regarding Claim 5, Sih further discloses that the far end speech signal that corresponds to the input signal claimed produces (i.e., is a component of) the echo signal (column 6, lines 4-10).

14. Regarding Claim 6, Sih further discloses outputting an echo replica signal (i.e., modified input signal) from the filter (Fig. 5, reference $y^{(n)}$; column 10, lines 1-4).

15. Regarding Claim 7, Sih further discloses attenuating input samples (i.e., scaling a binary range associated with filter taps) (column 17, lines 21-32) relative to a preset value near the top of the range (i.e., under which a desired portion of actually measured input values falls).

16. Regarding Claim 8, Sih further discloses a range of values between -8031 and +8031 that can inherently be represented by a plurality of bits (column 17, lines 21-26).

17. Regarding Claim 9, Sih further discloses attenuating input samples by 1.5 dB (i.e., the binary range is scaled proportionately) (column 17, lines 26-32).

18. Regarding Claim 10, Sih further discloses a range of values between -8031 and +8031 that are inherently represented by the negative of the absolute value of the high amplitude and the positive of the absolute value of the high amplitude (column 17, lines 21-26).

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19. Regarding Claim 11, Sih further discloses a range of values between -8031 and +8031 being the range provided by the vocoder. As such, the largest negative value binary value is the largest negative value those bits from that vocoder can represent and the largest positive is the largest positive value those bits from that vocoder can represent (column 17, lines 21-26).

20. Regarding Claim 12, Sih further discloses the high value being a value at the top of the range (i.e., the largest of a plurality of measured amplitudes) (column 17, lines 21-26).

21. Regarding Claim 13, Sih further discloses the high value being a value at the top of the range (i.e., a function of a sampling of a plurality of measured amplitudes) (column 17, lines 21-26).

22. Regarding Claim 26, Sih discloses a method for canceling echo (i.e., signal modification) comprising: receiving an unattenuated far-end speech signal (i.e., selecting an initial amplitude) (Fig. 5, reference $x(n)$; column 9, lines 14-16) at the input of an echo canceller filter (Fig. 5, reference 156, 158, 160); determining whether the input signal is near the extremes of a range (i.e., sampling the signal to determine actual high amplitude); attenuating input samples (column 17, lines 21-32) relative to a preset value near the top of the range (i.e., resetting the initial amplitude to the high amplitude). Sih further discloses implementing the method on a digital signal processor (i.e., an article of manufacture comprising a computer readable medium with instructions to carry out the method) (column 8, lines 65-67).

23. Regarding Claim 27, Sih further discloses a range of values between -8031 and +8031 that are inherently represented by the negative of the absolute value of the high amplitude and the positive of the absolute value of the high amplitude (column 17, lines 21-26).

Claim Rejections - 35 USC § 103

24. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

25. Claims 14 through 28 and 28 through 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu (US Patent 6,768,796) in view of Kawata et al (US Patent 5,029,121).

26. Regarding Claim 14, Lu discloses a finite impulse response adaptive filter echo canceller (Fig. 8; column 8, lines 50-57) in which a sequence of coefficients (i.e., $h_0(n)$ through $h_{L-1}(n)$) represent the impulse response of the echo-causing system (i.e., echo amplitude). Kawata discloses a finite impulse response filter (Fig. 1; column 1, lines 19-49) in which tap weights are scaled by: determining a storage capacity of a coefficient register (i.e., a range of values that may be held in binary by the tap) (column 5, lines 61-64); determining the location of the highest order effective bit in a coefficient (i.e., a range within which a normal echo amplitude of an audio signal falls) (Fig. 3b; column 6, lines 6-7); and shifting the bits in the coefficient to store only the highest order effective bit and less significant bits (i.e., scaling the range of values that may be held in binary by the tap to the range within which normal echo amplitude falls). Kawata further discloses that such an arrangement improves precision and prevents error (column 3, lines 65-68). It would have been obvious to one skilled in the art at the time of the invention to apply coefficient scaling as taught by Kawata to the echo canceller taught by Lu for the purpose of realizing the aforesaid advantages.

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27. Regarding Claim 15, Lu further discloses determining the coefficients (i.e., measuring echo amplitude) using the filter (column 6, lines 10-20). Kawata further discloses shifting the bits in the coefficient to store only the highest order effective bit and less significant bits (i.e., storing a value corresponding to the measured amplitude in the filter tapped based on the scale).

28. Regarding Claim 16, Lu further discloses subtracting summed filter tap products from an audio signal ($r(n)$) (i.e., reducing the audio signal by the amplitude represented by the filter tap) (Fig. 8, reference 460; column 6, lines 26-33).

29. All elements of Claims 17 through 22 are comprehended by Claims 14 through 16. As such, Claims 17 through 22 are rejected on the same grounds as Claims 14 through 16.

30. Regarding Claim 23, Lu discloses an Internet Telephony Gateway (Fig. 5, reference 302A; column 7, lines 25-48) that corresponds to the voice over internet protocol communication device claimed and performs a digitization, compression and packetization process (i.e., comprises an analog to digital converter and a digital audio transmitter coupled to the analog to digital converter) and reverses the digitization, compression and packetization process (i.e., comprises a digital audio receiver and a digital to analog decoder coupled to the digital audio receiver) (column 7, lines 38-42 and 58-60). Lu further discloses a finite impulse response adaptive filter echo canceller (Fig. 8; column 8, lines 50-57) in which a sequence of coefficients (i.e., $h_0(n)$ through $h_{L-1}(n)$) represent the impulse response of the echo-causing system (i.e., echo amplitude). Lu further discloses subtracting summed filter tap products from an audio signal ($r(n)$) (i.e., having an output to transmit a second signal equivalent to the first signal reduced by the second amplitude) (Fig. 8, reference 460; column 6, lines 26-33). Kawata discloses a finite impulse response filter (Fig. 1; column 1, lines 19-49) in which tap weights are scaled by:

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determining a storage capacity of a coefficient register (column 5, lines 61-64); determining the location of the highest order effective bit in a coefficient (Fig. 3b; column 6, lines 6-7); and shifting the bits in the coefficient to store only the highest order effective bit and less significant bits (i.e., scaling the range of values to a high amplitude incident on the first signal and storing a second amplitude in accordance with the scale). Kawata further discloses that such an arrangement improves precision and prevents error (column 3, lines 65-68). It would have been obvious to one skilled in the art at the time of the invention to apply coefficient scaling as taught by Kawata to the echo canceller taught by Lu for the purpose of realizing the aforesaid advantages.

31. Regarding Claims 24 and 25, Lu further discloses the gateway connected to analog telephone lines (column 7, lines 32-36) (i.e., converts digital audio to analog audio and analog audio to digital audio).

32. Claims 28 through 30 are essentially similar to Claims 14 through 16 and are rejected on the same grounds.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Swerdlow whose telephone number is 571-272-7531. The examiner can normally be reached on Monday through Friday between 7:30 AM and 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh H. Tran can be reached on 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Daniel Swerdlow
Examiner
Art Unit 2646

ds
13 July 2005